

WHAT IS CLAIMED IS:

Sub 927 1. An imaging device for imaging radiation, said
 2 imaging device comprising a semiconductor substrate
 3 including an array of detector cells which generate charge
 4 in response to incident radiation and a corresponding
 5 readout semiconductor substrate including an array of
 6 readout cells, said readout cells being connected to
 7 corresponding detector cells by low temperature solder
 8 bumps.

1 2. The imaging device of claim 1 wherein said
 2 solder bumps comprise solder having a melting point under
 3 180°C.

1 3. The imaging device of claim 1 wherein said
 2 solder bumps comprise solder having a melting point under
 3 120°C.

1 4. The imaging device of claim 1 wherein said
 2 solder bumps comprise solder having a melting point under
 3 100°C.

1 5. The imaging device of claim 1 wherein said
 2 solder bumps comprise lead-tin based solder having a
 3 melting point below that of eutectic lead-tin solder.

1 6. The imaging device of claim 1 wherein said
 2 solder bumps comprise solder including Bi, Pb, and Sn.

1 7. The imaging device of claim 1 wherein said

93¹¹
Curt¹²

devices;
image pro
from sai
image th

15

13

13

1. 14

17

1
2
3

6 detector cells and one of said readout cells forming an
7 image cell, said method comprising:

8 applying low temperature solder bumps to one of said
9 substrates at positions corresponding to said
10 image cells;

11 aligning respective readout and detector cells to
12 each other; and

13 connecting said detector and said readout cells by
14 the application of heat to said low temperature
15 solder bumps.

1 20. The method of claim ¹⁸~~19~~ wherein said solder bumps
2 are applied to said readout substrate at positions
3 corresponding to said readout cells.

1 21. The method of claim ¹⁸~~19~~ wherein said solder bumps
2 are applied to said readout substrate at positions
3 corresponding to said readout cells and to said detector
4 substrate at positions corresponding to said detector
5 cells.

1 22. The method of claim ¹⁸~~19~~ wherein said solder bumps
2 comprise solder having a melting point under 180°C.

1 23. The method of claim ¹⁸~~19~~ wherein said solder bumps
2 comprise solder having a melting point under 120°C.

1 24. The method of claim ¹⁸~~19~~ wherein said solder bumps
2 comprise solder having a melting point under 100°C.

1 25. The method of claim ¹⁸~~19~~ wherein said solder bumps

00963130-111297

all
Cont

20

1 26. The method of claim ~~19~~¹⁸ wherein said solder bumps
2 comprise a solder alloy of approximately 52 percent Bi,
3 approximately 32 percent Pb, and approximately 16 percent
4 Sn.

1 28. The method of claim ~~19~~¹⁸ wherein said solder bumps
2 comprise solder comprised of Bi and Sn and between 1 and
3 75 percent Pb.

1 30. The method of claim ~~19~~¹⁸ wherein said solder bumps
2 comprise a solder alloy including at least one of In, Cd,
3 Ga, Zn, Ag or Au.

21